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BEFORE THE PUBLIC UTILITIES COMMISSION
OF THE STATE OF CALIFORNIA

Order Instituting Rulemaking Regarding Broadband Infrastructure Deployment and to Support Service Providers in the State of California.	Rulemaking 20-09-001 (Filed September 10, 2020)

OPENING COMMENTS OF THE UTILITY REFORM NETWORK ON THE ASSIGNED COMMISSIONER'S RULING SEEKING COMMENT FOR THE LOCATIONS FOR A STATEWIDE OPEN-ACCESS MIDDLE-MILE BROADBAND NETWORK

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I. INTRODUCTION

In accordance with the August 6, 2021, *Assigned Commissioner's Ruling (ACR) Seeking Comment on the Locations for a Statewide Open-Access Middle-Mile Broadband Network*, The Utility Reform Network (TURN) submits these opening comments.

II. DISCUSSION

A. Background

On July 20, 2021, Governor Newsom signed Senate Bill (SB) 156 into law. The bill "create[d] a structure and framework for the construction of a $3.25 billion state-owned open-access middle mile broadband infrastructure . . ."[1] and with the explicit intent that "any state-owned assets constructed for the purposes of this bill shall not be sold to any other party for at least 20 years after the completion of construction."[2] The purpose of the state-owned middle-mile infrastructure is to "achieve the greatest reduction in the amount of households unserved by broadband internet access service meeting federal and state standards."[3] Priority is to be given to locations that enable last mile connections to residences unserved by 25 Mbps downstream and 3 Mbps upstream.[4]

As part of the structure and framework for construction of the state-owned open-access middle-mile broadband infrastructure, SB 156 directed this Commission to prepare a Staff

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[1] SB 156, Senate Floor Analyses, Senate Rules Committee, dated July 15, 2021, retrieved from https://leginfo.legislature.ca.gov/faces/billAnalysisClient.xhtml?bill_id=202120220SB156# (last viewed September 2, 2021) at p. 1.
[2] SB 156, Chap. 112, July 20, 2021, Section 1.
[3] SB 156, Assembly Floor Analysis, Committee on Budget and Fiscal Review, dated July 11, 2021, retrieved from https://leginfo.legislature.ca.gov/faces/billAnalysisClient.xhtml?bill_id=202120220SB156# (last viewed September 2, 2021) at p. 7.
[4] SB 156, Chap. 112 July 20, 2021, Section 3, 11549.54 (d).

Report to identify locations and criteria for the statewide network.[5] In accordance with SB 156, the Commission seeks public comment on the questions in this Ruling to inform the Commission regarding locations for the state-owned middle mile network.[6]

B. Responses to Assigned Commissioners' Questions

1. *Identifying Existing Middle Mile Infrastructure*

Attachment A provides a list of the state routes proposed for the statewide open access middle mile network, referred to as the "Anchor Build Fiber Highways." These routes may also be viewed on an ArcGIS map, which can be found here: https://www.arcgis.com/home/webmap/viewer.html?webmap=e17e4e1c88b04792ab0a2c50aa1a19a3&extent=-126.1445,34.5234,-113.5981,41.1113

a. What routes, if any, should be modified, removed from consideration, or revised? Provide an explanation for these suggestions.

TURN defers comment at this time and reserves the right to comment in reply.

b. Are there existing middle mile routes that are open access, with sufficient capacity, and at affordable rates on the county highway routes listed in Attachment A?

TURN defers comment at this time and reserves the right to comment in reply.

c. *In the context of these comments, what is sufficient capacity and affordable rates?*

The Commission is mandated to identify and prioritize middle-mile routes in regions without sufficient capacity to meet future middle mile needs.[7] For the Commission's review of existing middle mile infrastructure, the Commission should consider the capacity of the route to handle both current demand and, perhaps more importantly, future demand for open-access use by other carriers and interconnection that will anticipate growth in these specific regions. The Commission should only determine that existing middle-mile infrastructure has sufficient capacity when the route can meet the current needs of the communities—regardless of whether

[5] Gov. Code§ 11549.54 (a-e).
[6] Gov. Code §11549.54 (f).
[7] Pub. Util. Code §11549.54 (c).

communities are currently interconnected—along its path. Further, the criteria of sufficient capacity should not be deemed to be satisfied unless the infrastructure is "future proof," including the ability to accommodate future interconnection and flexibility to adapt to new services that may not even be available today.

These criteria should include a demonstration that the technology deployed on the route is modern and well-maintained. For example, the Commission recently ordered middle mile projects, funded by the California Advanced Services Fund (CASF), to support interconnection with other service providers but acknowledged that such interconnection may not be technically feasible due to capacity limitations of the middle mile facility, among other issues. In that Decision, the Commission granted Staff the authority to set capacity parameters for interconnection requirements.[8] Staff should be prepared to conduct the same analysis here, but it should also consider whether it is necessary to use different factors and considerations for the purpose of this larger and more extensive state-wide project as compared to the criteria it may adopt for the CASF middle mile projects that are more isolated. Additionally, Staff should be required to determine the extent to which existing middle-mile infrastructure has a history of service quality problems that have prevented entities such as competitive local exchange carriers, Internet service providers (ISPs), wireless Internet service providers (WISPs) or government agencies from obtaining middle-mile connections. Such problems should inform the Commission's analysis of whether those facilities provide "sufficient capacity" to be included in the state's middle mile network.

With respect to affordable rates, see TURN's response to Question #3. At this time, TURN has no comment on specific levels of affordable rates and may comment in reply.

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[8] D.21-03-006 (R.20-08-021) at p. 24.

d. For routes that are identified as being open access, with sufficient capacity, and at affordable rates, how should the Commission verify these claims (e.g., should Communications Division send a data request for service term sheets, rates, approximate dark fiber, lit fiber, and conduit capacity, etc.)? Are there any other criteria that should be used to verify these claims?

As suggested by the question, the Communications Division should send a data request for term sheets, available dark fiber, a detailed list of costs for leasing dark fiber, information about when the infrastructure was constructed, and how much capacity is available for current and *future* use. The Commission Staff should verify whether the current open access provisions for the identified fiber routes are available to all potential customers, including (but not limited to) wireline and wireless telecom service providers, ISPs, Tribes, broadband regional consortia, government agencies and non-profits. In addition to the data request, the Staff should solicit input from current and potential middle mile customers in each region, included but not limited to, competing ISPs and WISPs, Tribes, counties, local agencies, and the US Department of Agriculture, to better understand their experiences with obtaining and using existing infrastructure and whether current facilities meet their needs.

The Communications Division Staff should also include in the data request, questions about whether the provider considers the applicable open access requirement as permanent, or if it will phase out its open access offerings and, if so, the specific time frame for availability of the fiber under open access terms. If the open access requirement is to expire, the provider should specify its plans to continue to offer access to those facilities under different terms. This inquiry is necessary, in part, because in October 2020, the FCC issued a Report and Order that eliminates the requirement of Incumbent Local Exchange Carriers (ILECs), including AT&T and Frontier, to provide dark fiber transport as an unbundled network element (UNE) to competitive

telecommunication carriers.[9] Under the Telecommunications Act of 1996, the large dominant ILECs are required provide key network elements to other telecommunications companies at fair rates, terms and conditions.[10] The dark fiber UNE is used to provide both telecommunications and broadband service. In response to a petition from US Telecom, a trade association (that has now filed a motion for party status in this docket), the FCC has ordered that access to the dark fiber UNE will be phased out over an eight year period.[11] It will no longer be available as of October 2028.[12] Fiber that might be "open access" due to UNE rules today, will no longer be available to carriers, to the detriment of local and regional broadband service providers who depend on UNE fiber to provide service to customers.[13]

Further, the Staff's data request, and its inquiry to potential middle-mile customers in the region, should verify that the available capacity is sufficient to support both current and future use, as discussed further in the response to questions regarding network route capacity later in of these comments. The statutory priorities for state middle mile deployment include "regions without sufficient capacity to meet middle mile needs."[14] Also, as discussed above, if existing infrastructure is aging or in poor condition, the poor quality of plant affects the capacity of that facility and its ability to meet current and future middle mile needs. The Commission staff should verify that the plant is modern, well maintained and capable of supporting increasing demand for broadband.

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[9] *Modernizing Unbundling and Resale Requirements in an Era of Next-Generation Networks and Services*, Report and Order, WC Docket No. 19-308, adopted October 27, 2020 ("Order").
[10] 47 U.S.C. § 251. Interconnection.
[11] *Order*, para. 128.
[12] *Id*., para. 135.
[13] See, for example, *Modernizing Unbundling and Resale Requirements in an Era of Next-Generation Networks and Services*, Report and Order, WC Docket No. 19-308, Petition for Reconsideration of Sonic Telecom, LLC, February 2, 2021.
[14] Gov. Code § 11549.50; Gov. Code § 11549.54 (c).

2. Priority Areas

Federal funding must be encumbered and spent in a limited time period. Additionally, unserved and underserved areas of the state are in substantial need of broadband infrastructure investment.

a. Is it reasonable to assume counties with a disproportionately high number of unserved households (e.g., 50% or more unserved at 100 Mbps download) are areas with insufficient middle-mile network access?

TURN has not conducted a sufficient analysis to determine if it is reasonable to assume that all counties with a disproportionately high number of unserved customers at 100 Mbps download speed are areas with insufficient middle-mile network access. TURN may provide comments in its reply.

While limited middle mile facilities is one factor that a provider must consider when determining its portfolio of last mile residential service offerings, TURN cannot state with certainty that this factor is present in all areas with a disproportionally high number of "unserved" areas. TURN notes, for example, that in the digital redlining phase of this proceeding (Phase II-B), parties submitted comments that address digital equity as it impacts last mile infrastructure that may be available for broadband service and may result in unserved and underserved communities.[15] Communities that lack sufficient access to reliable and affordable high speed broadband services could be suffering from a lack of commercial middle mile facilities or the lack of access in these communities could result in a lack of demand for commercial middle mile facilities to serve those communities. The Commission should look more closely at this "chicken and egg" issue. Here, the Commission should consider several

[15] See, Assigned Administrative Law Judge's Ruling, May 28, 2021 (requesting comments on digital redlining and the potential for "systemic issues in the communications marketplace that disadvantage specific communities"). See, Opening Comments of TURN, July 2, 2021, at p. 2 (finding "significant evidence of digital redlining in California" that impact inner-city neighborhoods and rural areas of the state and that result in a lack of communications investment in these areas).

factors, including those discussed in the digital redlining comments,[16] when looking at a provider's decision whether to build middle mile facilities, determine the capacity of those facilities, and the resulting impact on the surrounding communities.

In addition, in the context of CASF, PUC Section 281 provides that "[m]onies appropriated for purposes of this section may be used to match or leverage federal moneys for communications infrastructure, *digital equity*, and adoption."[17] Through the CASF program, the Commission has a statutory duty to identify unserved areas and use federal and state funding to consider multiple factors when identifying root causes for lack of broadband access and how to address those root causes.[18] The additional authority granted to the Commission and other state agencies through this statewide middle mile network is yet another clear Legislative intent to allow the Commission to review the many factors that contribute to an area being identified as unserved and underserved. TURN looks forward to responding in reply to the opening comments submitted.

b. What other indicators, if any, should the Commission use to identify priority statewide open-access middle-mile broadband network locations (i.e., built expeditiously, areas with no known middle-mile network access, regions underserved by middle-mile networks, regions without sufficient capacity to meet future middle-mile needs)?

The Commission should use several considerations to evaluate the areas in greatest need of middle mile facilities that are also open access and offered at reasonable rates. The Commission has conducted extensive work to map the locations of infrastructure in California, including

[16] *Id*.
[17] Pub. Util. Code § 281 (b)(3).
[18] Pub. Util. Code § 281 (b)(1)(B)(ii)(I). TURN supports staff use of the 100 Mbps standard from the Governor's Executive Order as a benchmark to identify areas with insufficient residential broadband access; however, the Legislature has defined "unserved" in the context of CASF as areas with no offering of at least 25/3 Mbps or speeds that meet the criteria for funding under the federal Rural Digital Opportunity Fund, as applicable.

middle mile infrastructure. This mapping data can be used to identify priority areas where the mapping shows holes or gaps in coverage. Further, it is likely that other state agencies, such as CalTrans, have relevant data that can feed into the specific indicators to identify priority areas the Commission adopts. The same may be true for federal agencies, such as the US Department of Agriculture, which has a long-standing interest in extending broadband and data services to rural areas.[19]

The Commission should seek cost and rate data from middle mile providers to determine whether the Commission should give priority status to high-cost areas. Moreover, the Commission should favor projects that entail new builds, the communities without any middle mile facilities, or those that lack truly open access middle mile at affordable rates.

For the regions that have some middle mile but lack sufficient capacity to reach future middle mile needs, the Commission should consider these areas only after it considers areas with no middle mile. Additionally, as the Commission considers the impact of digital equity and historical practices of digital redlining on meaningful broadband access in this proceeding, those considerations should also be factors to identify priority projects for its state middle mile network.[20]

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[19] See, for example, California Broadband Council September 23, 2020, Meeting Minutes, presentation from Robert Tse, Senior Policy Advisor, Rural Utilities Service, Telecommunications Office, Rural Development, USDA, "Technical Assistance for Broadband," retrieved from https://broadbandcouncil.ca.gov/wp-content/uploads/sites/68/2020/09/CBC-Meeting-Minutes-Overview-9-23-20.pdf.

[20] See, Assigned Administrative Law Judge's Ruling, May 28, 2021, requesting comments on digital redlining and the potential for "systemic issues in the communications marketplace that disadvantage specific communities." See, Opening Comments of TURN, July 2, 2021, at p. 2 finding "significant evidence of digital redlining in California" that impact inner-city neighborhoods and rural areas of the state and that result in a lack of communications investment in these areas.

The Commission should also consider the expediency at which the middle mile may be built and available to communities. Areas where it is difficult to build middle mile are the least likely to be served by commercial middle mile providers. And, therefore, this lack of commercial middle mile facilities in these areas should be a factor when prioritizing projects. Further, another important factor when prioritizing routes should be the extent to which state middle mile infrastructure built in these locations where middle mile is difficult to build, would support more extensive and reliable public safety communications.

3. Assessing the Affordability of Middle Mile Infrastructure

A key consideration is determining the cost of various middle mile services. Through identifying the costs of these services in California, as well as across the country and globe the Commission can identify a threshold whereby services can be considered reasonably affordable.

a. What are existing providers paying or charging for middle mile services?

TURN defers comment at this time and reserves the right to comment in reply.

b. Are there other factors or sources of information the Commission should consider for determining whether these services are affordable?

TURN encourages the Commission to request current contracts from middle-mile providers to better assess the terms, conditions, and rates middle-mile providers are offering throughout the state. Those middle-mile providers should include, but not be limited to communications companies and electric Investor-Owned Utilities (IOUs), and include their contracts with other communications companies, municipalities and other large users that may lease middle mile capacity.[21] The Commission may also wish to consider information obtained in other CPUC proceedings, including R.20-08-012 (CASF), where applicants for CASF funding

[21] See e.g., Application 17-02-001 at pp. 1-2 ("Pursuant to Decision No. 98-10-058, the Commission granted SCE a Certificate of Public Convenience and Necessity (CPCN) to provide telecommunication services as a competitive local exchange carrier (CLC) in accordance with SCE's CPCN . . .").

must provide detailed cost and rate data to support their requests for funding. By comparing the rates, terms, and conditions in these contracts across providers and across different geographic regions, the Commission can begin to determine which terms, conditions, and rates may not be reasonable or affordable.

The Commission can also use other states' experiences as sources of case studies and lessons learned. In Kentucky[22] and Massachusetts,[23] the commonwealths' agencies provide middle-mile services. In other states, non-government organizations—nonprofits,[24, 25, 26] electric cooperatives, [27] educational entities,[28, 29] and public utility districts--offer middle-mile services.

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[22] "Kentucky Communications Network Authority Created to Manage Statewide Broadband Network," About KCNA, Kentucky Communications Network Authority, retrieved from https://kentuckywired.ky.gov/Pages/index.aspx ("KentuckyWired is unique in that it is an 'open access' network. This means cities, partnerships, private companies or other groups may acquire access to these 'middle-mile' lines . . .") (last viewed September 2, 2021).

[23] "Middle Mile Network," Middle Mile Program, Massachusetts Broadband Institute, retrieved from https://broadband.masstech.org/middle-mile-network ("MBI completed construction of open-access, middle mile fiber-optic network in early 2014 . . . . It is used as a building block to design and build last mile connections to residents and businesses in the regions still lacking high-speed internet services") (last viewed September 2, 2021).

[24] "Merit Dark Fiber Service," Dark Fiber, Merit, retrieved from https://www.merit.edu/network/merit-dark-fiber/ ("Access points of Merit's fiber-optic network for point-to-point connections through dark fiber IRUs or leases") (last viewed September 2, 2021).

[25] "About NoaNet," NoaNet, retrieved from https://www.noanet.net/about/ ("Formed by several Public Utility Districts (PUDs) in Washington state, NoaNet works with its partners to enhance economic and community opportunities by expanding its existing broadband network") (last viewed September 2, 2021).

[26] "About Us," Illinois Municipal Broadband Communications Association, retrieved from http://www.imbca.org/html/aboutus.html ("We are a non-for-profit association for Illinois municipalities and other entities interested in sharing information and resources about broadband services").

[27] Sho-Me Technologies LLC, retrieved from https://shometech.com/ (communications infrastructure provided by an electric cooperative) (last viewed September 2, 2021).

[28] MCNC's History, Microelectronics Center of North Carolina, retrieved from https://www.mcnc.org/who-we-are/history ("Since its inception, MCNC has continued to engineer and expand the backbone, supporting over 4,400 miles of fiber optic infrastructure to underserved and unserved communities in North Carolina") (retrieved from September 2, 2021).

[29] "OARnet History," Ohio Academic Resources Network, retrieved from https://www.oar.net/about/history ("The networks blankets the state, providing connectivity to Ohio's colleges and universities, K-12 schools, public broadcasting stations, academic medical centers, government agencies, and partnering research organizations") (last viewed September 2, 2021).

Some of these non-government organizations utilize IRUs to provide service.[30, 31] Some of these networks have been in operation for decades and can inform this Commission regarding the successes and challenges these networks face in providing middle-mile services through various types of topography and geography and to different populations and communities along their networks.

c. *Is it reasonable for the costs of these services to change depending on the location where the service is provided (i.e., rural vs urban)?*

TURN defers comment at this time and reserves the right to comment in reply.

4. ***Leasing Existing Infrastructure***

Indefeasible Rights of Use (IRUs) are long term leases (generally 20 to 30 years) for unrestricted, legal capacity on a communications network for a specified period of time.[1] These contracts generally obligate the purchaser to pay a portion of the operating costs, and the costs of maintaining the infrastructure.

a. *If there is existing open access communications infrastructure with sufficient capacity to meet the state's needs, should the state purchase IRUs from that network?*

The state should not enter into an agreement for an IRU to use as main routes or primary components of its middle mile network. The state is directed to build a middle mile network to serve areas that currently lack commercial infrastructure that meets the criteria spelled out in the statute. Areas that lack routes that meet these criteria should be candidates for the state middle mile construction. Project. Instead of expending resources on long-term IRUs to add capacity to the state middle mile core network, the funding and staff resources that would be required to

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[30] "Merit Dark Fiber Service," Dark Fiber, Merit, retrieved from https://www.merit.edu/network/merit-dark-fiber/ ("Access points of Merit's fiber-optic network for point-to-point connections through dark fiber IRUs or leases") (last viewed September 2, 2021).

[31] "Fiber Network," Mid-Atlantic Broadband Communities Corporation, retrieved from https://mbc-va.com/network/ ("MBC has fiber IRU agreements in place for diverse connections from the Southern Virginia regional network to Norther Virginia and key markets in the Southeastern United States . . .") (last viewed September 2, 2021).

secure leases should be used to carry out the work necessary to accomplish the task of overseeing the design, construction and operation of the state network. There is no need for the state network to build where there are commercial routes that comply with the criteria in the statute, provided that the state can verify that there is sufficient capacity, the network is truly open access, the rates are affordable and the plant is well maintained. Likewise, there is no need for the state to obtain leases for existing infrastructure that does not meet these criteria for use in its core network.

b. Is there any value in the state purchasing an IRU from the network if capacity is already available?

Although the state should not rely on IRUs or leasing of existing capacity to create any part of the "core" middle mile network, in some circumstances, it may be beneficial for the state to lease capacity for use as ancillary infrastructure, to support the state middle mile network in various ways. For example, such infrastructure might be useful as a means of providing diverse routing, as an additional communications path that could help ensure continuity of service if the state network is damaged or fails for some reason. This could be important for public safety, as it would offer an alternate communications path for public safety answering points, other emergency communications, and telecommunications and broadband services to end users. But these leased facilities should not be utilized as a primary component of the state network.

c. If the state relies on IRUs for the development of the statewide network, will the generational investment that this funding provides be diminished when the IRU leases end 20 to 30 years later? Will existing networks run out of spare capacity?

The demand for broadband service is growing significantly and in light of the rapid technological evolution within the industry, these services, and the networks that support them, will likely be used for purposes that are not even imagined today. It would be a wasted

opportunity if the state project fails to build state of the art middle mile that can support all crucial broadband and telecommunications services in a region for decades, especially in areas where the CPUC's evaluation shows that the existing network has insufficient capacity to meet future demand, is old, or is poorly maintained. The Staff is correct to be concerned that any existing middle mile it may lease over a 10-40 year period could well become obsolete, leaving the communities that it serves behind other areas of the state.

5. Interconnection

The statewide network will need to connect with other networks in order to deliver services.

a. At what points should the statewide network interconnect (e.g., to other networks, servers, etc.)?

At this time, TURN does not have the data nor has it conducted sufficient analysis to identify specific points of interconnection along the routes identified in Attachment A. However, TURN urges the Commission to explicitly recognize that the statewide middle mile network cannot be built as an island and must identify as many interconnection and traffic exchange points as technically feasible.[32] To broadly identify as many interconnection points as possible would "increase the attractiveness and usefulness" of the statewide network for commercial providers as well as each of the other stakeholders identified in the statute.[33] The OIR in this proceeding also identified concerns regarding situations where a provider has built middle mile facilities, but communities along the route are still unserved and underserved

[32] The Commission should be clear on the distinction between "open access" and "interconnection." SB156 defines the term open access to as "equal non-discriminatory access to eligible entities." "Interconnection" assumes that each entity has their own network and the networks must meet or "interconnect" to exchange communications "traffic." See, R.20-08-021 Staff Proposal, October 26, 2020; See also, R.20-08-021 Opening Comments of Greenlining and TURN on Staff Proposal, November 6, 2020.

[33] Gov. Code §11549.54 (f)(1)(B).

because last mile providers in those communities cannot interconnect or use those middle mile facilities.[34] The state should ensure that this middle mile network does not contribute to this problem.

In addition to the considerations discussed elsewhere in these comments to ensure open access and affordable middle mile services, the capability to interconnect is crucial for the state network to achieve its goals. The Legislature specifically intended that this network be designed to allow multiple stakeholders, including last mile providers, anchor institutions, tribal entities and municipal networks to interconnect and exchange traffic to support robust broadband telecommunications services to all corners of the state.[35] Even in areas where some middle mile and last mile facilities may exist, state middle mile facilities may be necessary along with access on fair rates, terms, and conditions.

TURN urges the state entities that are designing and building this network to look at the issues regarding interconnection in three ways. First, it must design the network to facilitate interconnection with a variety of stakeholders and using different types of interconnection arrangements including "colocation hotels," and other types of meet points. The network cables should be designed specifically to accommodate splicing and other work to allow interconnection. In a state as large and diverse as California, flexibility and scalability are important considerations for robust interconnection.

Second, the Commission must use its authority to ensure that all network providers, including incumbent carriers, competitive carriers, investor-owned utilities, and entities serving rural and underserved populations meet their legal obligations to interconnect on equitable and

[34] Order Instituting Rulemaking (R.20-09-001) at p. 10.
[35] Gov. Code §11549.52(a).

reasonable terms and conditions.[36] Obligations and authority to interconnect are core principles of the telecommunications network necessary to provide broadband. As part of its inquiry, the Commission should determine the appropriate terms and conditions for a limited number of standard interconnection agreements between the state middle mile network, commercial middle mile networks, and providers of last mile networks and services. Or, at a minimum the Commission should require providers to negotiate interconnection terms in good faith. Third, this Commission, and other state entities, should continue work to map and document existing telecommunications networks throughout the state, including investor-owned utility fiber networks, and existing interconnection meet points.[37] A similar set of data should be compiled as the state middle mile network is developed. This data should be available upon request by last mile providers, including tribal entities, nonprofits and municipalities that want to interconnect.

d. Are additional exchange points necessary or strategic, and if so, where?

See response to Question 5.a. TURN does not have additional comment on this question and reserves its right to reply.

6. <u>Network Route Capacity</u>

The state will need to determine the amount of capacity to build into the network to meet existing and future demand.

a. How many strands of fiber should the network deploy for each route?

TURN defers comment at this time and reserves the right to comment in reply.

b. Are there other requirements or standards the Commission needs to consider to determine sufficient capacity?

[36] See, 47 U.S.C. §251(a) (all telecommunications carriers have the duty to interconnect).
[37] See, Opening Comments of TURN on OIR (R.20-09-001), October 12, 2020, at p. 14.

Generally, the state should strive to build a network that is scalable. That is, the network should be able to accommodate future demand for interconnections and new uses for data services.[38] In a report discussing best practices for state broadband grant programs, the authors observed that successful programs consider current uses and future needs and consider that funded infrastructure "should be capable of upgrades to higher speeds at reasonable cost, rather than requiring full redeployment."[39] The report notes that these programs "have used a range of technology-neutral selection mechanisms to either favor the fastest broadband technologies or eliminate technologies that cannot meet minimum criteria" and to prioritize "faster, scalable technologies."

c. Should the network also deploy additional conduit within each route for potential future expansion?

In keeping with the importance of designing a network capable of supporting current and future demand, the network should deploy as much conduit as possible, based on the cost and engineering analysis that the state will conduct.

d. Should these factors change based on the population density and distance from the core network?

Fundamentally, regardless of population density served by a middle mile route and the middle mile route's distance from the core, the need to design the network to be scalable holds true. At this time, TURN defers comment on the specific engineering questions of whether the

[38] Scalability can be described as a network that can grow without losing availability and reliability. See, e.g., Cisco's definition of scalability, retrieved from https://ccna-200-301.online/scalable-networks/.
[39] *Putting State Broadband Funds to Work: Best Practices in State Rural Broadband Grant Programs*, Ryland Sherman, Joanne Hovis and Jacob Levin, Broadband Equity Partnership- CTC Technology & Energy and HR&A Advisors, Published by the Benton Institute for Broadband & Society, June 2021, at p. 15.

factors in question 6a-6c should vary based on population density and distance from the core network to reply comments.

However, the Commission should consider, more generally, that the state middle mile network's design could allow for investment in higher capacity networks in areas where a commercial middle mile network may not be very motivated to invest. Therefore, areas, including areas such as those with low population density, rural areas with last mile service situated farther from the core networks, and even more densely populated areas, especially those facing impacts of socioeconomic disparities, could benefit from a more scalable and flexible design through this state middle mile network than the middle mile network designed by commercial middle mile network providers.

There are examples of ways in which publicly funded networks specifically reached out to traditionally hard-to-reach areas through robust middle mile network design that serve as illustrations on reasons why the Commission should view the unique needs of communities factoring in population density, and relatedly, distance from the core network. First, an area's population density can suggest that the community, in addition with other considerations from the digital redlining context, that close review is needed. For example, lack of high-speed service offering in an area with great population density could reflect several problems, including lack of open access middle mile at reasonable rates. In a different scenario, a scarcely populated region without last mile service offerings can benefit from open access middle mile at affordable rates so that smaller last mile providers can afford to serve the community.[40] Second, an area's

[40] Prior to a middle mile initiative in Maine, broadband providers who sought to serve rural areas repeatedly called for middle-mile connectivity and after the initiative was completed, these providers utilized the middle-mile network. *See* Jordan Arnold and Jonathan Sallet, Benton Institute for Broadband Society, "If We Build It, Will They Come?, Lessons From Open-Access, Middle Mile Networks,"

distance from the core network, such as in remote areas,[41] should be viewed with service quality information, to determine whether the area has a middle mile network redundancy problem[42] that generates transmission bottlenecks. The longer the distance that data must travel, the greater the likelihood that the propagation time increases. Reducing propagation is a key reason why content delivery network services store content close to major customer hubs instead of feeding content from a central repository.[43] For these reasons, the Commission should consider these conditions as it evaluates whether there is sufficient capacity.

III. CONCLUSION

TURN supports the ACR's inquiry and offers the recommendations provided herein.

Dated: September 3, 2021

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December 2020, retrieved from https://www.benton.org/sites/default/files/OAMM_networks.pdf ("Benton Middle Mile Report") at p. 12.

[41] One example is the towns like Alford, Massachusetts that benefited from middle mile project, MassBroadband 123 which facilitated the town's connection to the middle mile. This town is 20 miles away from the nearest Internet point-of-presence. *See* Benton Middle Mile Report at p. 4.

[42] In Colorado, Project THOR is a middle mile network formed because the region that it serves lacked redundancy and it suffered from frequent and lengthy network outages. Here, new fiber was built, and existing fiber was leveraged to create a 400-mile network that connects 14 different communities. Judith Kohler, Denver Post, Tired of waiting for broadband, rural communities are tapping grants, partnerships to get modern internet (Dec. 30, 2019, 8:42am updated) https://www.denverpost.com/2019/12/30/rural-colorado-grants-funding-broadband-internet/. *See also, generally,* Benton Middle Mile Report.

[43] "Primer on Latency and Bandwidth," High Performance Browser Networking, 2013, retrieved from https://hpbn.co/primer-on-latency-and-bandwidth/ (last viewed September 3, 2021).